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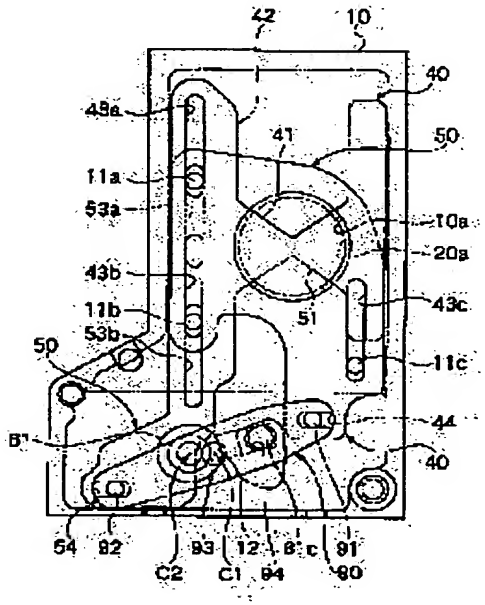
(54) CAMERA SHUTTER DEVICE AND DENSITY FILTER DEVICE

(57)Abstract:
PROBLEM TO BE SOLVED: To increase the actuating amount of a blade while miniaturizing a shutter device also used as a diaphragm.
SOLUTION: In the camera shutter device provided with a first sector body 40 and a second sector body 50 performing the opening/closing or the stopping of an aperture part 10a through which light is transmitted by moving back and forth in a direction in which they approach to and separate from each other and an electromagnetic actuator 60 to drive the first sector body and the second sector body, it is provided with an oscillating lever 90 linking the first sector body and the second sector body so as to move them back and forth by amplifying the driving amount of the electromagnetic actuator 60 by turning.



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* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1] The 1st bird root field and the 2nd bird root field which perform closing motion or drawing of opening which passes light by reciprocating in the direction approached and isolated to each other A driving source driven in order to make the 1st bird root field and the 2nd bird root field reciprocate It is the shutter equipment for cameras equipped with the above, and the amount of drives by rotation of said driving source is amplified, and it is characterized by what it has for an amplification linkage means interlocked so that said 1st bird root field and the 2nd bird root field may be made to reciprocate.
[Claim 2] Shutter equipment for cameras according to claim 1 characterized by what is consisted of a rocking lever characterized by providing the following Said amplification linkage means is the 1st end point connected with said a part of 1st bird root field free [rotation]. The 2nd end point connected with said a part of 2nd bird root field free [rotation] The rocking supporting point arranged in a location which is the middle of said 1st end point and 2nd end point, and was deflected from a rotation center of said driving source A driving force point which is arranged in a location of a distance shorter than distance from said rocking supporting point to said 1st end point or the 2nd end point, and does driving force of said driving source
[Claim 3] electromagnetism which has a yoke with which said driving source forms a magnetic path, a coil for excitation, and Rota which rotates a predetermined angle range according to electromagnetic force generated by energization to said coil -- from an actuator -- becoming -- said electromagnetism -- shutter equipment for cameras according to claim 1 or 2 characterized by what an actuator is magnetically energized for in a position of rest so that said 1st bird root field and the 2nd bird root field may close said opening.
[Claim 4] Shutter equipment for cameras according to claim 3 characterized by what a hall device for detecting the amount of rotation of said Rota is arranged for between said yokes and said Rota.
[Claim 5] claim 2 characterized by what it has a wing room in which said 1st bird root field and the 2nd bird root field are held, and said rocking lever is formed in the shape of sheet metal, and is arranged in said wing interior of a room thru/or 4 -- shutter equipment for cameras given in either.
[Claim 6] The concentration filter equipment for cameras characterized by what it is the concentration filter equipment equipped with a neutral density filter which adjusts luminous intensity which passes opening for passing light, and a driving source driven so that a neutral density filter may be made to reciprocate in order the amount of covers of opening by neutral density filter for cameras, the amount of drives by rotation of said driving source amplifies, and it has for the amplification linkage means which interlocks so that said neutral density filter may make reciprocate.
[Claim 7] said amplification linkage means be concentration filter equipment according to claim 6 for cameras which characterize by what consist of a rocking lever which have the end point connected with a part of supporter holding said neutral density filter free [rotation] , the rocking supporting point which have be arrange in the location which deflected from a rotation center of said driving source , and the driving force point which be arrange in the location of distance shorter than distance from said rocking supporting point to said end point , and do the driving force of said driving source .
[Claim 8] electromagnetism which has a yoke with which said driving source forms a magnetic path, a coil for excitation, and Rota which rotates a predetermined angle range according to electromagnetic force generated by energization to said coil -- concentration filter equipment for cameras according to claim 6 or 7 characterized by what is consisted of an actuator.
[Claim 9] Shutter equipment for cameras according to claim 8 characterized by what a hall device for

detecting the amount of rotation of said Rota is arranged for between said yokes and said Rota.
[Claim 10] claim 7 characterized by what it has a filter room in which said neutral density filter is held, and said rocking lever is formed in the shape of sheet metal, and is arranged in said filter interior of a room thru/or 9 -- concentration filter equipment for cameras given in either.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[The technical field to which invention belongs] This invention relates to the concentration filter equipment for cameras equipped with the neutral density filter (ND filter) which adjusts the shutter equipment for cameras and luminous intensity (quantity of light) which made drawing in the digital still camera which mainly photos the digital movie camera or static image which mainly photos a dynamic image etc. serve a double purpose.
[0002]
[Description of the Prior Art] When the wing of a pair slides in the direction approached or isolated to each other and reciprocates as shutter equipment of the drawing combination applied to a digital movie camera or a digital still camera, the shutter (iris shutter) equipment which performs the closing motion or drawing of opening which passes light is known.
[0003] As this kind of shutter equipment, a thing as shown, for example in drawing 11 exists. The 1st bird root field 2 and the 2nd bird root field 3 which have been arranged so that this shutter equipment may be slid along the plane in which the opening 1 which passes light was formed, the connecting linkage 4 interlocked in the direction which approaches and isolates these 1st bird root field 2 and the 2nd bird root field 3 to each other, and the electromagnetism which gives driving force to the 1st bird root field 2 and the 2nd bird root field 3 -- it has the actuator 5 grade.
[0004] Here, the 1st bird root field 2 and the 2nd bird root field 3 have piece 2b of an arm, 3b, etc. which are elongated from a drawing edge [at the time of extracting opening 1, respectively]a [2] and 3a, and end side, and the pins 2c and 3c for connection are implanted in this piece 2b of an arm, and 3b. Moreover, the connecting linkage 4 is arranged free [rotation] focusing on pivot 4a, long holes 4b and 4c are formed in those both ends, and Pins 2c and 3c are inserted to these long holes 4b and 4c, respectively. furthermore, electromagnetism -- an actuator 5 has arm 5c formed in Rota 5b which goes and comes back to a predetermined angle range to the circumference of medial-axis 5a, and rotates, and this Rota 5b in one, 5d of long holes is formed in free one end of this arm 5c, and pin 3c is inserted to 5d of this long hole.
[0005] therefore, electromagnetism, if Rota 5b of an actuator 5 is made to carry out predetermined angle rotation clockwise in drawing 11 Driving force is transmitted through pin 3c, and the 2nd bird root field 3 moves to the right sense (arrow head S1), and driving force is transmitted through a connecting linkage 4, and the 1st bird root field 2 will move to the left sense (arrow head S2), and will open opening 1. on the other hand -- electromagnetism -- when Rota 5b of an actuator 5 is rotated by the reverse sense, the 1st bird root field 2 and the 2nd bird root field 3 will move to the reverse sense, respectively, and as shown in drawing 11 , they will close opening 1 again. Moreover, by stopping rotation of Rota 5b in the middle of these actuation, opening 1 will extract and it will be extracted to the aperture of predetermined magnitude by Edges 2a and 3a.
[0006] moreover, pivot 4a of the connecting linkage 4 shown in drawing 11 as other shutter equipments and the same axle -- electromagnetism -- the rotation center of an actuator is arranged and what linked this pivot 4a with Rota directly, and linked direct connection or a connecting linkage 4 with Rota directly is known (JP,8-19239,A).
[0007]
[Problem(s) to be Solved by the Invention] By the way, it sets to the shutter equipment concerning the above-mentioned conventional technology. electromagnetism -- the amount L of drives by rotation of

an actuator 5 (length x angle of rotation of arm 5c of Rota 5b) -- about, since it becomes the travel (stroke) of the 2nd bird root field 3 and the 1st bird root field 2 for enlarging this travel more -- large-sized electromagnetism with a pivotable wide angle range -- it was necessary to use an actuator, consequently there was a problem of causing enlargement of equipment. moreover, electromagnetism -- the shutter equipment which makes the same axle the center of rotation (axis of rotation) of an actuator, and the center of rotation (pivot 4a) of a connecting linkage 4 -- setting -- the above-mentioned trouble -- in addition, it was necessary to carry out the coil for energization comparatively and to arrange it for 2 minutes, and to make high the height in the direction of the axis of rotation, and there was a problem of causing the increment in cost, enlargement of equipment, etc.

[0008] this invention is accomplished in view of the trouble of the above-mentioned conventional technology, and the place made into the purpose is to offer the shutter equipment for cameras which can enlarge the change cost of the travel of drawing of the wing object which performs closing motion or drawing of opening, i.e., the amount, etc., although a pivotable angle range is comparatively alike and a narrow small driving source is used. moreover, although a pivotable angle range is comparatively alike and uses a narrow small driving source, it is in offering the concentration filter equipment for cameras which can enlarge travel (change width of face of the amount of covers) of the neutral density filter for adjusting the luminous intensity (quantity of light) which passes opening etc.

[0009]

[Means for Solving the Problem] Shutter equipment for cameras of this invention by reciprocating in the direction approached and isolated to each other The 1st bird root field and the 2nd bird root field which perform closing motion or drawing of opening which passes light, It is the shutter equipment for cameras equipped with a driving source driven in order to make the 1st bird root field and the 2nd bird root field reciprocate, and the amount of drives by rotation of the above-mentioned driving source is amplified, and it is characterized by what it has for an amplification linkage means interlocked so that the 1st bird root field and the 2nd bird root field may be made to reciprocate. According to this configuration, if a driving source rotates only the predetermined amount of drives, this amount of drives will be amplified by predetermined magnitude with an amplification linkage means, and will be transmitted to the 1st bird root field and the 2nd bird root field. Therefore, even if the amount of drives of a driving source is comparatively small, travel (movement magnitude) of the 1st bird root field and the 2nd bird root field becomes large. Travel (stroke) of drawing actuation can be made to increase, being able to use a small driving source with a narrow rotation angle, and miniaturizing equipment, also when this performs drawing actuation to opening with large aperture.

[0010] The 1st end point by which an amplification linkage means was connected with a part of 1st bird root field free [rotation] in the above-mentioned configuration, In middle of the 2nd end point connected with a part of 2nd bird root field free [rotation], and the these 1st end points and the 2nd end point And the rocking supporting point arranged in a location deflected from a rotation center of a driving source, A configuration which consists of a rocking lever which has a driving force point which is arranged in a location of a distance shorter than distance from this rocking supporting point to the 1st end point or the 2nd end point, and does driving force of a driving source is employable. According to this configuration, if driving force by rotation of a driving source is applied to a driving force point, a rocking lever will carry out predetermined angle rotation a center [the rocking supporting point]. And the 1st bird root field and the 2nd bird root field are made to move to reverse sense through the 1st end point and the 2nd end point, respectively. In this case, since the rocking supporting point of a rocking lever is in a location deflected from a rotation center of a driving source and a driving force point is in a location of a distance shorter than distance from the rocking supporting point to the 1st end point or the 2nd end point, angle of rotation of a rocking lever becomes larger than angle of rotation of a driving source. That is, angle of rotation of a driving source is amplified, a rocking lever will rotate a bigger angle range and, only in the part, travel (movement magnitude) of the 1st bird root field and the 2nd bird root field also becomes large.

[0011] electromagnetism which has Rota which rotates a predetermined angle range according to electromagnetic force generated in the above-mentioned configuration by energization to a yoke with which a driving source forms a magnetic path, a coil for excitation, and this coil -- from an actuator -- becoming -- this electromagnetism -- in a position of rest, a configuration magnetically energized so that the 1st bird root field and the 2nd bird root field may close opening can be used for an actuator. According to this configuration, in non-energizing hibernation, magnetic energization force will act and

the 1st bird root field and the 2nd bird root field will close opening.
[0012] In the above-mentioned configuration, a configuration by which a hall device for detecting the amount of rotation of Rota between a yoke and Rota has been arranged is employable. According to this configuration, in order to arrange a hall device between a yoke and Rota, change of flux density is measured by high degree of accuracy by hall device, and, thereby, an angle-of-rotation location of Rota is detected by high degree of accuracy. Moreover, a miniaturization of equipment is performed. In the above-mentioned configuration, a configuration which it has a wing room in which the 1st bird root field and the 2nd bird root field are held, and a rocking lever is formed in the shape of sheet metal, and is arranged in the above-mentioned wing interior of a room is employable. According to this configuration, thin-shape-izing and a miniaturization of the whole equipment are performed.
[0013] Moreover, concentration filter equipment for cameras of this invention A neutral density filter which adjusts luminous intensity which passes opening for passing light, Are the concentration filter equipment for cameras equipped with a driving source driven so that a neutral density filter may be made to reciprocate in order to adjust the amount of covers of opening by neutral density filter, and the amount of drives by rotation of the above-mentioned driving source is amplified. It is characterized by what it has for an amplification linkage means interlocked so that a neutral density filter may be made to reciprocate. According to this configuration, if a driving source rotates only the predetermined amount of drives, this amount of drives will be amplified by predetermined magnitude with an amplification linkage means, and will be transmitted to a neutral density filter. Therefore, even if the amount of drives of a driving source is comparatively small, travel (movement magnitude) of a neutral density filter becomes large. Travel (stroke) of cover actuation by neutral density filter can be made to increase, being able to use a small driving source with a narrow rotation angle, and miniaturizing equipment, also when this performs adjustment actuation of the amount of covers to opening with large aperture.
[0014] It is employable in the configuration which consists of a rocking lever which has the driving-force point which an amplification linkage means is arranged in the above-mentioned configuration in the location of a distance shorter than distance from an end point connected with a part of supporter holding a neutral density filter free [rotation], the rocking supporting point arranged in a location deflected from a rotation center of a driving source, and this rocking supporting point to an end point, and does the driving force of a driving source. According to this configuration, if driving force by rotation of a driving source is applied to a driving force point, a rocking lever will carry out predetermined angle rotation a center [the rocking supporting point]. And a neutral density filter is made to move with the supporter through an end point. In this case, since the rocking supporting point of a rocking lever is in a location deflected from a rotation center of a driving source and a driving force point is in a location of a distance shorter than distance from the rocking supporting point to an end point, angle of rotation of a rocking lever becomes larger than angle of rotation of a driving source. That is, angle of rotation of a driving source is amplified, a rocking lever will rotate a bigger angle range and travel (movement magnitude) of a neutral density filter [as opposed to opening only in the part] also becomes large.
[0015] electromagnetism which has Rota which rotates a predetermined angle range according to electromagnetic force generated in the above-mentioned configuration by energization to a yoke with which a driving source forms a magnetic path, a coil for excitation, and this coil -- a configuration which consists of an actuator is employable. according to this configuration -- electromagnetism -- since the angle range of rotation of an actuator may be narrow -- electromagnetism -- the actuator itself can be miniaturized.
[0016] In the above-mentioned configuration, a configuration by which a hall device for detecting the amount of rotation of Rota between a yoke and Rota has been arranged is employable. According to this configuration, in order to arrange a hall device between a yoke and Rota, change of flux density is measured by high degree of accuracy by hall device, and, thereby, an angle-of-rotation location of Rota is detected by high degree of accuracy. Moreover, a miniaturization of equipment is performed. In the above-mentioned configuration, a configuration which it has a filter room in which a neutral density filter is held, and a rocking lever is formed in the shape of sheet metal, and is arranged in the above-mentioned filter interior of a room is employable. When being used together with shutter equipment not to mention thin-shape-izing and a miniaturization of equipment itself being performed according to this configuration, thin shape-ization in the direction of a laminating (the thickness direction) can be performed as a whole.
[0017]

[Embodiment of the Invention] Hereafter, the gestalt of operation of this invention is explained, referring to an accompanying drawing. Drawing 1 thru/or drawing 5 are what shows 1 operation gestalt of the shutter equipment for cameras concerning this invention, and the concentration filter equipment for cameras. Drawing 1 (a), (b), and (c) show front view, a sectional side elevation, and rear view, respectively, drawing 2 shows internal structure drawing seen from the transverse-plane side, drawing 3 shows the cross section which looked at the equipment shown in drawing 2 from the bottom, drawing 4 shows internal structure drawing seen from the back side, and drawing 5 shows the cross section which looked at the equipment shown in drawing 4 from the bottom. In addition, in drawing 1 (b), the expedient top of explanation and the internal structure are omitted the part (the 1st bird root field 40 mentioned later and the 2nd bird root field 50, neutral density filter 70 grade).

[0018] The equipment concerning this operation gestalt is shutter equipment for quantity of light adjustable mold cameras which combines the shutter ability (shutter equipment for cameras) of drawing combination, and the function (concentration filter equipment for cameras) of a neutral density filter to adjust luminous intensity (quantity of light) to adjustable. The shutter cope plate 10 by which the laminating was carried out one by one as shown in drawing 1 , the filter cope plate 20, and the filter pressure plate 30, The 1st bird root field 40 and the 2nd bird root field 50 (refer to drawing 3) which have been arranged between these shutter cope plate 10 and the filter cope plate 20, the electromagnetism as a driving source which is arranged on the outside of the shutter cope plate 10, and drives the 1st bird root field 40 and the 2nd bird root field 50 -- with an actuator 60 (referring to drawing 1 (b)) electromagnetism -- with an amplification linkage means to amplify drive actuation of an actuator 60 to the 1st bird root field 40 and the 2nd bird root field 50, and to interlock it with them The neutral density filter 70 (refer to drawing 4 and drawing 5) arranged between the filter cope plate 20 and the filter pressure plate 30, the electromagnetism as a driving source which is arranged on the outside of the filter pressure plate 30, and drives a neutral density filter 70 -- an actuator 80 (refer to drawing 1 (c)) and electromagnetism -- it has an amplification linkage means to amplify drive actuation of an actuator 80 to a neutral density filter 70, and to interlock it with it etc., as the basic configuration.

[0019] Here, as shown in drawing 1 , as for the shutter cope plate 10, the filter cope plate 20, and the filter pressure plate 30, circular opening 10a and opening 20a for making nothing and those abbreviation central fields pass light, and opening 30a of a rectangle configuration are formed in the outline of an abbreviation rectangle configuration, respectively. Moreover, between the shutter cope plate 10 and the filter cope plate 20, as shown in drawing 1 (b), a predetermined gap is vacated and the wing room W in which it shows the 1st bird root field 40 and the 2nd bird root field 50 free [reciprocation], and they are held is demarcated. On the other hand, as shown also between the filter cope plate 20 and the filter pressure plate 30 at drawing 1 (b), a predetermined gap is vacated and the filter room F in which it shows the maintenance plate 75 as a supporter holding a neutral density filter 70 and this free [reciprocation], and it is held is demarcated.

[0020] The drawing edge 41 which is positioned in the near field of Openings 10a and 20a, and makes the drawing function of Openings 10a and 20a as the 1st bird root field 40 is shown in drawing 2 , The notching section 42 which cut in the shape of an abbreviation rectangle, and was lacked toward the top following this drawing edge 41, The shape of the basic form is formed of the long holes 43a, 43b, and 43c elongated and formed in the reciprocation direction in the both-sides edge field, and the long hole 44 grade which developed in the bottom field in the direction which carries out an abbreviation rectangular cross in the reciprocation direction, and was formed. And the guide pins 11a, 11b, and 11c projected and prepared in those long holes 43a, 43b, and 43c from the shutter cope plate 10 fit in loosely, respectively, and this 1st bird root field 40 is guided at these guide pins 11a, 11b, and 11c, and can reciprocate freely in the vertical direction in drawing 2 . In addition, drawing 2 shows the condition that the 1st bird root field 40 moved to the upper migration edge.

[0021] The drawing edge 51 which is positioned in the near field of Openings 10a and 20a, and makes the drawing function of Openings 10a and 20a as the 2nd bird root field 50 is shown in drawing 2 , The notching section 52 which cut in the shape of an abbreviation rectangle, and was lacked toward the bottom following this drawing edge 51, The shape of the basic form is formed of the long holes 53a and 53b elongated and formed in the reciprocation direction in the side edge section field, and the long hole 54 grade which developed in the bottom field in the direction which carries out an abbreviation rectangular cross in the reciprocation direction, and was formed. And this 2nd bird root field 50 is arranged inside equipment (back side), the guide pins 11a and 11b prepared in those long holes 53a and

53b at the shutter cope plate 10 have fitted in loosely, respectively, and it is guided at these guide pins 11a and 11b, and can reciprocate in the vertical direction in drawing 2 more freely than the 1st bird root field 40. In addition, drawing 2 shows the condition that the 2nd bird root field 50 moved to the downward migration edge.

[0022] In the bottom field of the wing room W where these 1st bird root field 40 and the 2nd bird root field 50 have been arranged, the rocking lever 90 as an amplification linkage means is arranged. The 1st engagement pin 91 and the 2nd engagement pin 92 which this rocking lever 90 was cast in the shape of [long picture] sheet metal with the resin material etc., and were prepared in both ends, respectively, The shape of that basic form is formed of the long hole 94 grade formed in the location of a distance shorter than the distance from the circular hole 93 formed in the middle of these 1st engagement pin 91 and the 2nd engagement pin 92, and this circular hole 93 to the 1st engagement pin 91.

[0023] And this rocking lever 90 is arranged on the outside (near side) of equipment rather than the 1st bird root field 40 and the 2nd bird root field 50, as shown in drawing 2 . The 1st engagement pin 91 fits loosely into the long hole 44 of the 1st bird root field 40, and the **** 2 engagement pin 92 has fitted loosely into the long hole 54 of the 2nd bird root field 50, respectively. Moreover, the pivot 12 which projects from the shutter cope plate 10 is fitted in the circular hole 93 located at the center, and arm 61c of Rota 61 mentioned later has fitted loosely into the long hole 94 further. Here, the center C1 of a pivot 12 is arranged in the location which deflected only the predetermined distance D1 (refer to drawing 3) from the rotation center C2 of Rota 61 mentioned later.

[0024] That is, rocking of the rocking lever 90 is attained at the circumference of a pivot 12, rotation actuation of this rocking lever 90 is interlocked with, and the 1st bird root field 40 and the 2nd bird root field 50 reciprocate. When the rocking lever 90 rotates to the counterclockwise rotation in drawing 2 , for example, the 1st bird root field 40 and the 2nd bird root field 50 It moves in the direction (direction which closes Openings 10a and 20a) close to each other, and on the other hand, when the rocking lever 90 rotates to the clockwise rotation in drawing 2 , the 1st bird root field 40 and the 2nd bird root field 50 move in the direction (direction which opens Openings 10a and 20a) isolated to each other.

[0025] In the above-mentioned configuration, the 1st engagement pin 91 connected with the long hole 44 which is a part of 1st bird root field 40 free [rotation] is equivalent to the 1st end point. The 2nd engagement pin 92 connected with the long hole 54 which is a part of 2nd bird root field 50 free [rotation] is equivalent to the 2nd end point. And the circular hole 93 (pivot 12 with a center C1) arranged in the location deflected from the rotation center C2 of Rota 61 which is a driving source is equivalent to the rocking supporting point. the middle of these 1st engagement pin 91 and the 2nd engagement pin 92 -- the portion of the long hole 94 arranged in the location of a distance shorter than the distance from this circular hole 93 (pivot 12) to the 1st engagement pin 91 or the 2nd engagement pin 92 -- electromagnetism -- it is equivalent to the driving force point which does the driving force of an actuator 60.

[0026] thus, the rocking supporting point (C1) of the rocking lever 90 -- electromagnetism -- since it is in the location deflected from the rotation center C2 of an actuator 60 and a driving force point (long hole 94) is in the location of a distance shorter than the distance from the rocking supporting point (C1) to the 1st end point (the 1st engagement pin 91) or the 2nd end point (the 2nd engagement pin 92) -- angle of rotation of the rocking lever 90 -- electromagnetism -- it becomes larger than angle of rotation of a namely, electromagnetism -- angle of rotation of an actuator 60 is amplified, the rocking lever 90 will rotate a bigger angle range, and, only in the part, the travel (movement magnitude) of the 1st bird root field 40 and the 2nd bird root field 50 also becomes large. Moreover, the rocking lever 90 is cast in the shape of sheet metal with a resin material etc., since it is arranged in the wing room W where the 1st bird root field 40 and the 2nd bird root field 50 have been arranged, it does not need to prepare the hold room of dedication specially, can make it simple structure, and can perform thin-shape-izing and a miniaturization of the whole equipment.

[0027] the electromagnetism as a driving source -- an actuator 60, as shown in drawing 1 (a) and drawing 3 Rota 61 which covered the circumference of the rotation center C2 in the predetermined angle range, and has been arranged free [rotation], The outside housing 62 and the inside housing 63 which are supported for this Rota 61, enabling free rotation, It is constituted by the coil 64 for the excitation for generating electromagnetic force by energization, the yoke 65 which is arranged on Rota 61 and this heart and forms a magnetic path, the hall device 66 which detects change of flux density, and the magnetic member 67 grade.

[0028] As Rota 61 is making the shape of an approximate circle pilaster and shows it to drawing 3 , the edge of arm 61c where the shanks 61a and 61b formed in the shaft-orientations both ends fit into bearing hole 62a of the outside housing 62 and bearing hole 63a of the inside housing 63 free [rotation], respectively, project from a part of the periphery, and go to the interior of equipment has fitted loosely into the long hole 94 of the above-mentioned rocking lever 90. Moreover, this Rota 61 is magnetized by N pole and the south pole bordering on the plane which passes along a medial axis (rotation center C2).
[0029] As shown in drawing 3 , the circular sulci 62b and 63b of a cross-section rectangle configuration are formed in the outside housing 62 and the inside housing 63, and the coil 64 is wound in this circular-sulcus 62b and 63b. Moreover, the inside housing 63 fixes to the shutter cope plate 10 by the connection pawl 13 and conclusion screw 100 grade which were formed in the outside of the shutter cope plate 10, and fixes the outside housing 62 with a connection pawl etc. to the inside housing 63.
[0030] a hall device 66 is shown in drawing 1 (a) and drawing 3 -- as -- the outside of the outside housing 62 -- and it is arranged between the insides of a yoke 65, i.e., Rota 61 and a yoke 65, and when flux density changes with rotation of Rota 61 (a magnetic field changes), a different voltage value is outputted. namely, the output voltage value of a hall device 66 and angle of rotation (the amount of rotation) of Rota 61 -- the actuated position (travel) of the 1st bird root field 40 and the 2nd bird root field 50 is connected further beforehand, and the angle-of-rotation location (the actuated position or travel of the 1st bird root field 40 and the 2nd bird root field 50) of Rota 61 is detected from the obtained output voltage.
[0031] In the time, i.e., hibernation, of un-energizing [which the magnetic member 67 is a member of the shape of a cylinder which it is connected inside a yoke 65 and elongated in parallel with the rotation medial axis C2 of Rota 61 as shown in drawing 1 (a), and it does not energize in a coil 64] The rotation energization force of a magnetic counterclockwise rotation is done so that the counterclockwise rotation in drawing 1 (a) may be made to rotate Rota 61, namely, so that it may be held in the location where the 1st bird root field 40 and the 2nd bird root field 50 closed opening 10a.
[0032] In the above-mentioned configuration, if the current of the predetermined direction is passed by the coil 64 and this current value is increased gradually, when the generated electromagnetic force will overcome the magnetic energization force of acting by hibernation, Rota 61 begins to rotate to drawing 1 (a) and the clockwise rotation in drawing 2 , and the rocking lever 90 begins to rotate to the clockwise rotation in drawing 2 through arm 61c and a long hole 94. Thereby, it goes caudad, and moves and the 1st bird root field 40 moves the 2nd bird root field 50 toward the upper part. And when the maximum migration is carried out, the 1st bird root field 40 and the 2nd bird root field 50 open Openings 10a and 20a completely.
[0033] On the other hand, if the current value passed in a coil 64 is decreased gradually, it will begin to rotate to drawing 1 (a) and the counterclockwise rotation in drawing 2 , and the rocking lever 90 will begin to rotate Rota 61 to the counterclockwise rotation in drawing 2 through arm 61c and a long hole 94. Thereby, the 1st bird root field 40 moves toward the upper part, and the 2nd bird root field 50 goes caudad, and it moves it. And when the maximum migration is carried out, the 1st bird root field 40 and the 2nd bird root field 50 close Openings 10a and 20a completely, and return to a position of rest. Moreover, if the current of the reverse sense is passed in a coil 64, Rota 61 will be quickly rotated to drawing 1 (a) and the counterclockwise rotation in drawing 2 , and the 1st bird root field 40 and the 2nd bird root field 50 will return to a position of rest quickly. In addition, in the above-mentioned actuation, it is made to fluctuate suitably the rotational speed and the amount of angle of rotation of Rota 61 by controlling the amount of current passed in a coil 64 by the desired value, and the angle-of-rotation location of Rota 61 is serially detected by the voltage value outputted from a hall device 66. Furthermore, drawing actuation for extracting Openings 10a and 20a to desired aperture is performed by controlling the current passed to a coil 64 so that rotation of Rota 61 may stop, after the opening of an abbreviation rhombus has been demarcated by the location 41 as for which Rota 61 carried out predetermined angle rotation, i.e., the drawing edge of the 1st bird root field 40, and the drawing edge 51 of the 2nd bird root field 50.
[0034] the electromagnetism which constitutes the above -- the small electromagnetism from which the amount of drives by rotation serves as an angle-of-rotation range which is about 30 degrees by having adopted the rocking lever 90 as above amplification linkage means as an actuator 60 -- the large-sized electromagnetism which set up the amount of drives greatly since an actuator was employable -- the whole equipment can be miniaturized compared with the case where an actuator is used. the 1st bird

root field 40 described above and the 2nd bird root field 50, and electromagnetism -- the shutter equipment for cameras of drawing combination which can be extracted to desired aperture by the actuator 60 and rocking lever 90 grade while opening and closing Openings 10a and 20a is constituted.
[0035] The neutral density filter 70 which forms some concentration filter equipments for cameras is a light filter which decreases luminous intensity (quantity of light), without almost producing change of a color, and, generally is also called ND (neutral density) filter. And it is stuck on the maintenance plate 75 and this neutral density filter 70 is held, as shown in drawing 4 . Notching section 75a which was positioned in the near field of Openings 10a, 20a, and 30a, cut in the shape of an abbreviation rectangle toward the top, and was lacked as this maintenance plate 75 was shown in drawing 4 , It is formed at the abbreviation configuration for U characters equipped with the long holes 75b and 75c elongated and formed in the reciprocation direction in the both-sides edge field, 75d of long holes which developed in the reciprocation direction in the bottom field in the direction which carries out an abbreviation rectangular cross, and were formed, etc. And the neutral density filter 70 is stuck so that some fields of notching section 75a may be covered.
[0036] Moreover, the guide pins 21a and 21b projected and prepared in those long holes 75b and 75c from the filter cope plate 20 have fitted in loosely, respectively, and this maintenance plate 75 is guided at these guide pins 21a and 21b, and can reciprocate freely in the vertical direction in drawing 4 . In addition, drawing 4 shows the condition of the neutral density filter 70 having moved to the downward migration edge, and having opened Openings 10a and 20a wide.
[0037] In the bottom field of the filter room F where these concentration filter 70 and the maintenance plate 75 have been arranged, the rocking lever 110 as an amplification linkage means is arranged. This rocking lever 110 is cast in the shape of [long picture] sheet metal with the resin material etc., and as shown in drawing 4 , the shape of that basic form is formed of the circular hole 113 grade formed in long hole 112 approach rather than the middle of the engagement pin 111 prepared in that end section, the long hole 112 formed in that other end, and a these engagement pin 111 and a long hole 112.
[0038] And as this rocking lever 110 is shown in drawing 4 , rather than the maintenance plate 75 and the neutral density filter 70, it has been arranged on the outside (near side) of equipment, and that engagement pin 111 has fitted loosely into 75d of long holes of the maintenance plate 75, and the pivot 22 which projects from the filter cope plate 20 is fitted in that circular hole 113, and arm 81c of Rota 81 mentioned later has fitted loosely into the long hole 112 further. Here, the center C3 of a pivot 22 is arranged in the location which deflected only the predetermined distance D2 (refer to drawing 5) from the rotation center C4 of Rota 81 mentioned later.
[0039] That is, rocking of the rocking lever 110 is attained at the circumference of a pivot 22, rotation actuation of this rocking lever 110 is interlocked with, and the maintenance plate 75 70, i.e., a neutral density filter, reciprocates. For example, when the rocking lever 110 rotates to the counterclockwise rotation in drawing 4 , a neutral density filter 70 moves the maintenance plate 75 in the direction which opens Openings 10a and 20a, and on the other hand, when the rocking lever 110 rotates to the clockwise rotation in drawing 4 , as for the maintenance plate 75, a neutral density filter 70 moves Openings 10a and 20a in the direction of a wrap.
[0040] The engagement pin 111 connected with 75d of long holes which are some maintenance plates 75 holding a neutral density filter 70 free [rotation] in the above-mentioned configuration is equivalent to an end point. The circular hole 113 (pivot 22 with a center C3) arranged in the location deflected from the rotation center C4 of Rota 81 which is a driving source is equivalent to the rocking supporting point. the portion of the long hole 112 arranged in the location of a distance shorter than the distance from this circular hole 113 (pivot 22) to the engagement pin 111 -- electromagnetism -- it is equivalent to the driving force point which does the driving force of an actuator 80.
[0041] thus, the rocking supporting point (C3) of the rocking lever 110 -- electromagnetism -- since it is in the location deflected from the rotation center C4 of an actuator 80 and a driving force point (long hole 112) is in the location of a distance shorter than the distance from the rocking supporting point (C3) to an end point (engagement pin 111) -- angle of rotation of the rocking lever 110 -- electromagnetism -- it becomes larger than angle of rotation of an actuator 80. namely, electromagnetism -- angle of rotation of an actuator 80 is amplified, the rocking lever 110 will rotate a bigger angle range, and, only in the part, the travel (movement magnitude) of the maintenance plate 75 70, i.e., a neutral density filter, also becomes large.
[0042] Moreover, the rocking lever 110 is cast in the shape of sheet metal with a resin material etc.,

since it is arranged in the filter room F where the neutral density filter 70 and the maintenance plate 75 have been arranged, it does not need to prepare the hold room of dedication specially, can make it simple structure, and can perform thin-shape-izing and a miniaturization of the whole equipment.
[0043] the electromagnetism as a driving source -- an actuator 80, as shown in drawing 1 (c) and drawing 5 Rota 81 which covered the circumference of the rotation center C4 in the predetermined angle range, and has been arranged free [rotation], The outside housing 82 and the inside housing 83 which are supported for this Rota 81, enabling free rotation, It is constituted by the hall device 86 grade which detects the coil 84 for the excitation for generating electromagnetic force by energization, the yoke 85 which is arranged on Rota 81 and this heart and forms a magnetic path, and change of flux density.
[0044] As Rota 81 is making the shape of an approximate circle pilaster and shows it to drawing 5 , the edge of arm 81c where the shanks 81a and 81b formed in the shaft-orientations both ends fit into bearing hole 82a of the outside housing 82 and bearing hole 83a of the inside housing 83 free [rotation], respectively, project from a part of the periphery, and go to the interior of equipment has fitted loosely into the long hole 112 of the above-mentioned rocking lever 110. Moreover, this Rota 81 is magnetized by N pole and the south pole bordering on the plane which passes along a medial axis (rotation center C3).
[0045] As shown in drawing 5 , the circular sulci 82b and 83b of a cross-section rectangle configuration are formed in the outside housing 82 and the inside housing 83, and the coil 84 is wound in this circular-sulcus 82b and 83b. Moreover, through connection pawl 120a and the conclusion screw 130 grade which are located in the outside of the connecting plate 120 which fixed to the filter pressure plate 30, the inside housing 83 fixes to the filter pressure plate 30, and fixes the outside housing 82 with a connection pawl etc. to the inside housing 83.
[0046] a hall device 86 is shown in drawing 1 (c) and drawing 5 -- as -- the outside of the outside housing 82 -- and it is arranged between the insides of a yoke 85, i.e., Rota 81 and a yoke 85, and when flux density changes with rotation of Rota 81 (a magnetic field changes), a different voltage value is outputted. namely, the output voltage value of a hall device 86 and angle of rotation (the amount of rotation) of Rota 81 -- the actuated position (travel) of the maintenance plate 75 and a neutral density filter 70 is connected further beforehand, and the angle-of-rotation location (the actuated position or the amount of covers of a neutral density filter 70) of Rota 81 is detected from the obtained output voltage.
[0047] In the above-mentioned configuration, if the current of the predetermined direction is passed by the coil 84, according to the generated electromagnetic force, it will begin to rotate to the clockwise rotation in drawing 1 (c), and the rocking lever 110 will begin to rotate Rota 81 to the clockwise rotation in drawing 4 through arm 81c and a long hole 112. When the maintenance plate 75 moves up along with guide pins 21a and 21b and it moves to the maximum upper part by this, a neutral density filter 70 will cover Openings 10a and 20a to the maximum extent.
[0048] On the other hand, if the current of the reverse sense is passed by the coil 84, according to the electromagnetic force generated in the reverse sense, it will begin to rotate to the counterclockwise rotation in drawing 1 (c), and the rocking lever 110 will begin to rotate Rota 81 to the counterclockwise rotation in drawing 4 through arm 81c and a long hole 112. When the maintenance plate 75 moves caudad along with guide pins 21a and 21b and it moves to the maximum lower part by this, a neutral density filter 70 will open Openings 10a and 20a completely. Moreover, by stopping rotation of Rota 81 in the middle of the above-mentioned actuation, and holding in a desired angle-of-rotation location, a neutral density filter 70 can adjust the amount of wrap covers for Openings 10a and 20a suitably, and, thereby, can adjust the luminous intensity (quantity of light) which passes Openings 10a and 20a. in addition, the above -- electromagnetism -- the drive of an actuator 80 -- facing -- the above-mentioned -- electromagnetism -- since it does not have a magnetic member 67 like an actuator 60, the energization force of initial setting cannot work but only the part can control the rotation by the comparatively small amount of current.
[0049] moreover, the electromagnetism which constitutes the above by having adopted the rocking lever 110 as above amplification linkage means -- the small electromagnetism from which the amount of drives by rotation serves as an angle-of-rotation range which is about 30 degrees as an actuator 80 -- the large-sized electromagnetism which enlarged the amount of drives since an actuator was employable -- the whole equipment can be miniaturized compared with the case where an actuator is used. the

neutral density filter 70 described above, the maintenance plate 75, and electromagnetism -- the concentration filter equipment for cameras which adjusts the luminous intensity (quantity of light) which passes Openings 10a and 20a by the actuator 80 and rocking lever 110 grade is constituted.
[0050] Next, actuation when the shutter equipment for quantity of light adjustable mold cameras concerning the above-mentioned operation gestalt is carried in a digital movie camera and a digital still camera is explained, referring to drawing 6 thru/or drawing 10 . In the digital movie camera and digital still camera in which the equipment of this operation gestalt is carried, the photodetection sensor which detects luminous intensity (quantity of light), and the control sections (CPU etc.) which manage various control are prepared. Moreover, relation with the relative aperture of the openings 10a and 20a by the output voltage value of a hall device 66, the angle of rotation 40 of Rota 61, i.e., the 1st bird root field, and the 2nd bird root field 50 is beforehand memorized by the control section as a control map. Furthermore, the relation between the output voltage value of a hall device 86 and angle of rotation (quantity of light) of Rota 81, i.e., the optical reinforcement according to the amount of covers of the openings 10a and 20a by the neutral density filter 70, is beforehand memorized by the control section as a control map.
[0051] First, in a digital movie camera, when photoing a dynamic image if a photography person operates the carbon button for animation photography -- first -- electromagnetism -- the coil 64 of an actuator 60 -- receiving -- the predetermined direction -- and, when the current of the specified quantity is passed and Rota 61 rotates clockwise As shown in drawing 6 (a), the 1st bird root field 40 in the location (closing location) which closed Openings 10a and 20a in hibernation, and the 2nd bird root field 50 are moved to the location (open position) which opened Openings 10a and 20a fully, as shown in drawing 7 (a). In addition, in this case, a neutral density filter 70 is in the location (open position) which opened Openings 10a and 20a wide, as shown in drawing 6 (b) and drawing 7 (b).
[0052] Then, luminous intensity (quantity of light) is detected by the photodetection sensor, and the detecting signal is sent to a control section. And based on this detecting signal and a control map, an operation is made suitably. the control signal which reduces the amount of current to pass, a control signal 64, i.e., the coil, from which the aperture of Openings 10a and 20a is extracted, here when luminous intensity (quantity of light) is too (too bright) strong -- the electromagnetism from a control section -- as it is sent to an actuator 60, and the 1st bird root field 40 and the 2nd bird root field 50 move in the direction close to each other, for example, it is shown in drawing 8 (a), it stops in the place used as the In addition, in this condition, as shown in drawing 8 (b), a neutral density filter 70 is in the condition of having opened Openings 10a and 20a wide and of not operating.
[0053] in addition, the control signal outputted based on a control map etc. while this drawing actuation acts as the monitor of the luminous intensity (quantity of light) by the photodetection sensor -- always -- electromagnetism -- the amount of drives of an actuator 60 is controlled, and it is automatically controlled so that the amount of drawing becomes the optimal. Moreover, this drawing actuation is controlled not to become smaller than predetermined aperture, in order to prevent the diffraction phenomena of the light depended for extracting too much. And when it becomes the optimal drawing, a dynamic image is photoed by the image sensor (CCD). Photography of this dynamic image performs continuous coma **** photography by repeating the actuation which emits the charge accumulated in the image sensor (CCD).
[0054] By the way, even if the above-mentioned drawing actuation is performed, when it cannot adjust to the optimal luminous intensity (quantity of light), adjustment by the neutral density filter 70 is performed. That is, the 1st bird root field 40 and the 2nd bird root field 50 are held beforehand in a predetermined actuated position (it sets to a predetermined relative aperture). and the electromagnetism from a control section -- all the fields (drawing 9 (a)) of opening by which the neutral density filter 70 moved up and was demarcated by the drawing edge 41 and the drawing edge 51 as a control signal was sent towards an actuator 80, Rota 81 rotated to a predetermined angle clockwise rotation and it was shown in drawing 9 -- or some fields (drawing 9 (b)) -- a wrap -- it is controlled like. the control signal outputted based on a control map etc. while the cover actuation by this neutral density filter 70 acts as the monitor of the luminous intensity (quantity of light) by the photodetection sensor -- always -- electromagnetism -- the amount of drives of an actuator 80 is controlled, and it is automatically controlled so that the amount of covers becomes the optimal.
[0055] Then, since it is already adjusted to the optimal relative aperture from the condition shown in drawing 9 which was photoing this dynamic image when photoing a static image, if a photography person

performs release actuation, the charge accumulated in the image sensor (CCD) will once be emitted, and will be reset (the recorded image is eliminated), and exposure actuation will be started. here, if the proper time amount (exposure time) calculated by the control section passes, a control signal will output from a control section -- having -- electromagnetism -- the current of the reverse sense is passed by the coil 84 of an actuator 80, and Rota 81 rotates quickly counterclockwise, and the 1st bird root field 40 and the 2nd bird root field 50 move in the direction which approaches, respectively, and close Openings 10a and 20a. Thereby, exposure actuation is completed and a static image is photoed.
[0056] next -- if a photography person performs release actuation in a digital still camera when photoing a static image -- first -- electromagnetism -- the coil 64 of an actuator 60 -- receiving -- the predetermined direction -- and the current of the specified quantity is passed and Rota 61 rotates clockwise. And as shown in drawing 6 (a), the 1st bird root field 40 and the 2nd bird root field 50 in the location (closing location) which closed Openings 10a and 20a in hibernation are moved to the location (open position) which opened Openings 10a and 20a fully, as shown in drawing 7 (a). and the electromagnetism after going through predetermined time amount (exposure time) -- the coil 64 of an actuator 60 -- receiving -- the reverse sense -- and the current of the specified quantity is passed, and when Rota 61 rotates counterclockwise (circumference of reverse), as shown in drawing 6 (a), the 1st bird root field 40 and the 2nd bird root field 50 move to the location (closing location) which closed Openings 10a and 20a again. Thereby, exposure actuation is completed and a static image is photoed. In addition, in photography of this static image, when luminous intensity does not need to be adjusted, a neutral density filter 70 is in the location (open position) which opened Openings 10a and 20a wide, as shown in drawing 6 (b) and drawing 7 (b).
[0057] on the other hand, when luminous intensity (quantity of light) is too (too bright) strong, a control signal outputs from a control section -- having -- electromagnetism -- the coil 84 of an actuator 80 -- the predetermined direction -- and the current of the specified quantity is ****(ed). And when Rota 81 rotates clockwise, a neutral density filter 70 is moved up and is suitably controlled by a cover (refer to drawing 10) and the optimal condition in Openings 10a and 20a. then, the above-mentioned -- the same -- electromagnetism -- the drive of an actuator 60 is controlled, exposure actuation by the 1st bird root field 40 and the 2nd bird root field 50 is performed, and a static image is photoed.
[0058] then -- if a photography person operates the carbon button for animation photography when photoing a dynamic image -- first -- electromagnetism -- the coil 64 of an actuator 60 -- receiving -- the predetermined direction -- and, when the current of the specified quantity is passed and Rota 61 rotates clockwise As shown in drawing 6 (a), the 1st bird root field 40 in the location (closing location) which closed Openings 10a and 20a in hibernation, and the 2nd bird root field 50 are moved to the location (open position) which opened Openings 10a and 20a fully, as shown in drawing 7 (a).
[0059] And a predetermined operation is made based on the detecting signal and control map about the luminous intensity (quantity of light) detected by the photodetection sensor, and when luminous intensity (quantity of light) is too strong The control signal which reduces the amount of current to pass, a control signal 64, i.e., the coil, from which the aperture of Openings 10a and 20a is extracted the electromagnetism from a control section -- as it is sent to an actuator 60, and the 1st bird root field 40 and the 2nd bird root field 50 move in the direction close to each other, for example, it is shown in drawing 8 (a), it stops in the place used as the optimal relative aperture. Furthermore, even if the above-mentioned drawing actuation is performed, when it cannot adjust to the optimal luminous intensity (quantity of light), adjustment with the concentration filter 70 as shown in drawing 9 is performed like the above-mentioned. And when it becomes the optimal drawing and optical reinforcement (quantity of light), by repeating the actuation which emits the charge accumulated in the image sensor (CCD), continuous coma **** photography is performed and a dynamic image is photoed.
[0060] As stated above, also in the digital movie camera which mainly photos a dynamic image, a dynamic image can be photoed by applying the equipment of this invention also in the digital still camera which can photo a static image and mainly photos a static image.
[0061] Although the shutter equipment for quantity of light adjustable mold cameras which combines the shutter equipment for cameras which makes drawing and shutter ability, and the concentration filter equipment for cameras which adjusts luminous intensity (quantity of light) was shown, in the above-mentioned operation gestalt, the concentration filter equipment for cameras which can apply only the shutter equipment for cameras concerning this invention to various cameras, and applies to this invention is applicable to various cameras with other shutter equipments.

[0062] Moreover, although what has arranged the rocking supporting point (a pivot 12 and circular hole 93) was adopted in the middle on the straight line which connects the 1st end point (the 1st engagement pin 91) and the 2nd end point (the 2nd engagement pin 92) in the above-mentioned operation gestalt as a rocking lever 90 which is the amplification linkage means of the shutter equipment for cameras Although this rocking supporting point may be the configuration deflected in the location from which it separated from the straight line which connects the 1st end point and the 2nd end point and what has arranged the driving force point (a long hole 94 and arm 61c) was adopted on the straight line which connects the rocking supporting point and the 1st end point As long as this driving force point is the location of a distance shorter than the distance from the rocking supporting point to the 1st end point or the 2nd end point, it may be the configuration deflected in the location from which it separated from the straight line which connects the straight line which connects the rocking supporting point and the 1st end point or the rocking supporting point, and the 2nd end point.
[0063]
[Effect of the Invention] The amount of drives by rotation of the driving source driven in order to make the 1st bird root field and the 2nd bird root field which perform the closing motion or drawing of opening which passes light reciprocate as stated above according to the shutter equipment for cameras of this invention is amplified. Since the amount of drives of a driving source is amplified and it is transmitted to the 1st bird root field and the 2nd bird root field by having established the amplification linkage means interlocked so that the 1st bird root field and the 2nd bird root field may be made to reciprocate, Even if the amount of drives of a driving source is comparatively small, travel (movement magnitude) of the 1st bird root field and the 2nd bird root field can be enlarged. Therefore, the travel (stroke) of drawing actuation can be made to increase, being able to use a small driving source with a narrow rotation angle, and miniaturizing equipment, also when performing drawing actuation to opening with large aperture.
[0064] Moreover, thin-shape-izing of equipment and the equipment as the whole can be miniaturized by using an amplification linkage means as a sheet metal-like rocking lever, and arranging this rocking lever in the wing room in which the 1st bird root field and the 2nd bird root field are held. furthermore, the electromagnetism which consists of a yoke, a coil, Rota, etc. as a driving source -- by having adopted the actuator and having prepared the hall device between a yoke and Rota, it can control to high degree of accuracy, the angle-of-rotation location, i.e., the relative aperture, of Rota, and equipment can be miniaturized.
[0065] Moreover, according to the concentration filter equipment for cameras of this invention, opening for passing light is received. By having amplified the amount of drives by rotation of the driving source driven so that the neutral density filter which adjusts luminous intensity may be made to reciprocate, and having established the amplification linkage means interlocked so that a neutral density filter may be made to reciprocate The amount of drives of a driving source is amplified, and it is transmitted to a neutral density filter, and accumulates, and even if the amount of drives of a driving source is comparatively small, travel (movement magnitude) of a neutral density filter can be enlarged. Therefore, the adjustment cost by the neutral density filter can be made to increase, being able to use a small driving source with a narrow rotation angle, and miniaturizing equipment, also when performing adjustment actuation of the amount of covers to opening with large aperture.
[0066] Moreover, thin-shape-izing of equipment and the equipment as the whole can be miniaturized by using an amplification linkage means as a sheet metal-like rocking lever, and arranging this rocking lever in the filter room in which a neutral density filter is held. furthermore, the electromagnetism which consists of a yoke, a coil, Rota, etc. as a driving source -- controlling the angle-of-rotation location of covers of Rota, i.e., the amount of a neutral density filter, to high degree of accuracy by having adopted the actuator and having prepared the hall device between a yoke and Rota — moreover, equipment can be miniaturized.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the schematic diagram showing 1 operation gestalt of the shutter equipment for cameras concerning this invention, and neutral density filter equipment, and (a) is [a sectional side elevation and (c of front view and (b))] rear view.
[Drawing 2] It is the outline block diagram of the shutter equipment for cameras.
[Drawing 3] It is the cross section which looked at the shutter equipment for cameras shown in drawing 2 from the bottom.
[Drawing 4] It is the outline block diagram of the concentration filter equipment for cameras.
[Drawing 5] It is the cross section which looked at the concentration filter equipment for cameras shown in drawing 4 from the bottom.
[Drawing 6] It is drawing explaining actuation of the shutter equipment for cameras, and neutral density filter equipment, and the condition that opening was closed, and (b) of (a) are drawings in which a neutral density filter shows the condition of not operating.
[Drawing 7] It is drawing explaining actuation of the shutter equipment for cameras, and neutral density filter equipment, and the condition that opening was opened fully, and (b) of (a) are drawings in which a neutral density filter shows the condition of not operating.
[Drawing 8] It is drawing explaining actuation of the shutter equipment for cameras, and neutral density filter equipment, and the condition that opening was extracted to predetermined aperture, and (b) of (a) are drawings in which a neutral density filter shows the condition of not operating.
[Drawing 9] It is drawing explaining actuation of the shutter equipment for cameras, and neutral density filter equipment, and the condition to which the rat tail and the neutral density filter operated greatly to aperture predetermined in opening, and (b) are drawings in which (a) shows the condition that the rat tail and the neutral density filter operated slightly at aperture predetermined in opening.
[Drawing 10] (a) is the condition that are in the condition in which it is drawing explaining actuation of the shutter equipment for cameras, and neutral density filter equipment, and the neutral density filter operated greatly, and opening was closed, and drawing, in which a neutral density filter is in the condition in which it operated slightly, and (b) shows the condition that opening was closed.
[Drawing 11] It is drawing showing the conventional shutter equipment for cameras.
[Description of Notations]
10a, 20a Opening
12 22 Pivot (rocking supporting point)
40 1st Bird Root Field
41 Drawing Edge
50 2nd Bird Root Field
51 Drawing Edge
60 Electromagnetism -- Actuator (Driving Source)
61 Rota 61C Arm (Driving Force Point)
64 Coil
65 Yoke
66 Hall Device
67 Magnetic Member
70 Neutral Density Filter (ND Filter)
75 Maintenance Plate (Supporter)

80 Electromagnetism -- Actuator (Driving Source)
81 Rota 81C Arm (Driving Force Point)
84 Coil
85 Yoke
86 Hall Device
90 Rocking Lever (Amplification Linkage Means)
91 1st Engagement Pin (1st End Point)
92 2nd Engagement Pin (2nd End Point)
93 Circular Hole (Rocking Supporting Point)
94 Long Hole (Driving Force Point)
110 Rocking Lever (Amplification Linkage Means)
111 Engagement Pin (End Point)
112 Long Hole (Driving Force Point)
113 Circular Hole (Rocking Supporting Point)

[Translation done.]

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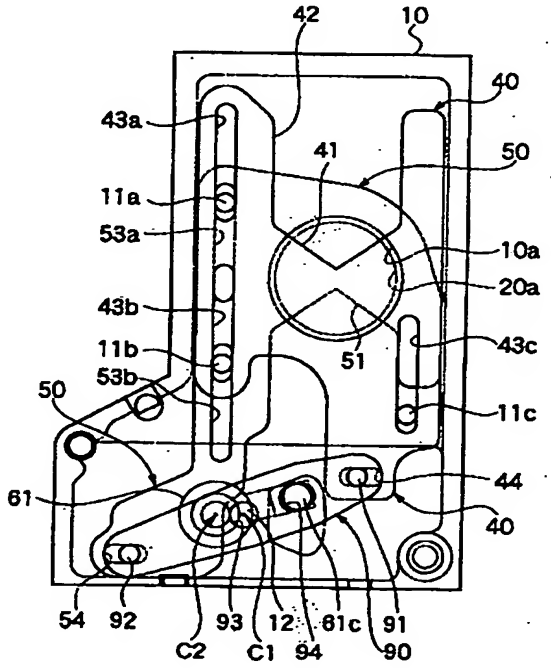
(54)【発明の名称】　カメラ用シャッタ装置及び濃度フィルタ装置

(57)【要約】
【課題】絞り兼用のシャッタ装置において、装置の小型化を図りつつ羽根の作動量を増加させる。
【解決手段】お互いに近接及び離隔する方向に往復動して光を通過させる開口部１０ａの開閉あるいは絞りを行なう第１羽根体４０及び第２羽根体５０と、第１羽根体及び第２羽根体を駆動する電磁アクチュエータ６０とを備えたカメラ用シャッタ装置において、この電磁アクチュエータ６０の回動による駆動量を増幅して、第１羽根体及び第２羽根体を往復動させるように連動させる揺動レバー９０を設けた。



側には長孔５ｄが形成されており、この長孔５ｄに対してピン３ｃが遊挿されている。

【０００５】したがって、電磁アクチュエータ５のロータ５ｂが、図１１において時計回りに所定角度回転させられると、ピン３ｃを介して駆動力が伝達されて、第２羽根体３は右向き（矢印Ｓ１）に移動し、又、連結リンク４を介して駆動力が伝達されて、第１羽根体２は左向き（矢印Ｓ２）に移動し、開口部１を開放することになる。一方、電磁アクチュエータ５のロータ５ｂが逆向きに回転させられることにより、第１羽根体２及び第２羽根体３はそれぞれ逆向きに移動して、図１１に示すように再び開口部１を閉鎖することになる。また、これらの動作の途中でロータ５ｂの回転を止めることにより、開口部１が絞り縁部２ａ，３ａにより所定の大きさの口径に絞られることになる。

【０００６】また、他のシャッタ装置として、図１１に示す連結リンク４の支軸４ａと同軸に電磁アクチュエータの回動中心を配置し、この支軸４ａをロータに直結あるいは連結リンク４をロータに直結したものが知られている（特開平８－１９２３９号公報）。

【０００７】

【発明が解決しようとする課題】ところで、上記従来技術に係るシャッタ装置においては、電磁アクチュエータ５の回転による駆動量Ｌ（ロータ５ｂの腕部５ｃの長さ×回転角度）がほぼ第２羽根体３及び第１羽根体２の作動量（ストローク）になるため、この作動量をより大きくするには、回転可能な角度範囲が広い大型の電磁アクチュエータを用いることが必要になり、その結果、装置の大型化を招くという問題があった。また、電磁アクチュエータの回転中心（回転軸）と連結リンク４の回転中心（支軸４ａ）を同軸とするシャッタ装置においては、上記の問題点に加えて、通電用のコイルを２分割にして配置すること、回転軸方向における高さを高くすることが必要になり、コスト増加、装置の大型化等を招くという問題があった。

【０００８】本発明は、上記従来技術の問題点に鑑みて成されたものであり、その目的とするところは、回転可能な角度範囲が比較的に狭い小型の駆動源を用いつつも、開口部の開閉あるいは絞りを行なう羽根体の作動量、すなわち、絞り量の変化代等を大きくすることのできるカメラ用シャッタ装置を提供することにある。また、回転可能な角度範囲が比較的に狭い小型の駆動源を用いつつも、開口部を通過する光の強度（光量）を調整するための濃度フィルタの作動量（覆い量の変化幅）等を大きくすることのできるカメラ用濃度フィルタ装置を提供することにある。

【０００９】

【課題を解決するための手段】本発明のカメラ用シャッタ装置は、お互いに近接及び離隔する方向に往復動することにより、光を通過させる開口部の開閉あるいは絞りを行なう第１羽根体及び第２羽根体と、第１羽根体及び第２羽根体を往復動させるべく駆動する駆動源とを備えたカメラ用シャッタ装置であって、上記駆動源の回動による駆動量を増幅して、第１羽根体及び第２羽根体を往復動させるように連動させる増幅連動手段を有する、ことを特徴としている。この構成によれば、駆動源が所定の駆動量だけ回動すると、この駆動量が増幅連動手段により所定の大きさに増幅されて第１羽根体及び第２羽根体に伝達される。したがって、駆動源の駆動量が比較的小さくても、第１羽根体及び第２羽根体の作動量（移動量）が大きくなる。これにより、口径の大きい開口部に対して絞り動作を行なう場合にも、回動角度の狭い小型の駆動源を用いることができ、装置の小型化を行ないつつ、絞り動作の作動量（ストローク）を増加させることができる。

【００１０】上記構成において、増幅連動手段は、第１羽根体の一部に回動自在に連結された第１連結点と、第２羽根体の一部に回動自在に連結された第２連結点と、これら第１連結点と第２連結点との中間でかつ駆動源の回動中心から偏倚した位置に配置された揺動支点と、この揺動支点から第１連結点又は第２連結点までの距離よりも短い距離の位置に配置されて駆動源の駆動力を及ぼす駆動力点とを有する揺動レバーからなる、構成を採用することができる。この構成によれば、駆動源の回動による駆動力が駆動力点に加えられると、揺動支点を中心として揺動レバーが所定角度回転する。そして、第１連結点及び第２連結点を介して、第１羽根体及び第２羽根体がそれぞれ逆向きに移動させられることになる。この際に、揺動レバーの揺動支点は駆動源の回動中心から偏倚した位置にあり、かつ、駆動力点は揺動支点から第１連結点又は第２連結点までの距離よりも短い距離の位置にあるため、揺動レバーの回転角度は駆動源の回転角度よりも大きくなる。すなわち、駆動源の回転角度が増幅されて、揺動レバーはより大きな角度範囲を回転することになり、その分だけ、第１羽根体及び第２羽根体の作動量（移動量）も大きくなる。

【００１１】上記構成において、駆動源は、磁路を形成するヨークと、励磁用のコイルと、このコイルへの通電により発生した電磁力により所定の角度範囲を回動するロータとを有する電磁アクチュエータからなり、この電磁アクチュエータは、休止位置において、第１羽根体及び第２羽根体が開口部を閉鎖するように磁気的に付勢されている、構成を採用することができる。この構成によれば、非通電の休止状態においては、磁気的な付勢力が作用して、第１羽根体及び第２羽根体は開口部を閉鎖することになる。

【００１２】上記構成において、ヨークとロータとの間に、ロータの回動量を検出するためのホール素子が配置された、構成を採用することができる。この構成によれば、ホール素子をヨークとロータとの間に配置するた

には、光を通過させるための円形の開口部１０ａ及び開口部２０ａ、矩形形状の開口部３０ａがそれぞれ形成されている。また、シャッタ地板１０とフィルタ地板２０との間には、図１（ｂ）に示すように、所定の間隔が空けられて、第１羽根体４０及び第２羽根体５０を往復動自在に案内して収容する羽根室Ｗが画定されている。一方、フィルタ地板２０とフィルタ押え板３０との間にも、図１（ｂ）に示すように、所定の間隔が空けられて、濃度フィルタ７０及びこれを保持する保持体としての保持プレート７５を往復動自在に案内して収容するフィルタ室Ｆが画定されている。

【００２０】第１羽根体４０は、図２に示すように、開口部１０ａ，２０ａの近傍領域に位置付けられて開口部１０ａ，２０ａの絞り機能をなす絞り縁部４１と、この絞り縁部４１に続いて上側に向かって略矩形状に切り欠かれた切り欠き部４２と、両側端部領域において往復動方向に伸長して形成された長孔４３ａ，４３ｂ，４３ｃと、下側領域において往復動方向に略直交する方向に伸長して形成された長孔４４等により、その基本形状が形成されている。そして、この第１羽根体４０は、その長孔４３ａ，４３ｂ，４３ｃにシャッタ地板１０から突出して設けられたガイドピン１１ａ，１１ｂ，１１ｃがそれぞれ遊嵌され、これらガイドピン１１ａ，１１ｂ，１１ｃに案内されて図２中の上下方向に往復動自在となっている。尚、図２は、第１羽根体４０が上方の移動端に移動した状態を示している。

【００２１】第２羽根体５０は、図２に示すように、開口部１０ａ，２０ａの近傍領域に位置付けられて開口部１０ａ，２０ａの絞り機能をなす絞り縁部５１と、この絞り縁部５１に続いて下側に向かって略矩形状に切り欠かれた切り欠き部５２と、側端部領域において往復動方向に伸長して形成された長孔５３ａ，５３ｂと、下側領域において往復動方向に略直交する方向に伸長して形成された長孔５４等により、その基本形状が形成されている。そして、この第２羽根体５０は、第１羽根体４０よりも装置の内側（後方側）に配置されて、その長孔５３ａ，５３ｂにシャッタ地板１０に設けられたガイドピン１１ａ，１１ｂがそれぞれ遊嵌されており、これらガイドピン１１ａ，１１ｂに案内されて図２中の上下方向に往復動自在となっている。尚、図２は、第２羽根体５０が下方の移動端に移動した状態を示している。

【００２２】これら第１羽根体４０及び第２羽根体５０が配置された羽根室Ｗの下側領域には、増幅連動手段としての揺動レバー９０が配置されている。この揺動レバー９０は、樹脂材料等により長尺な薄板状に成型されたものであり、両端部にそれぞれ設けられた第１係合ピン９１及び第２係合ピン９２と、これら第１係合ピン９１及び第２係合ピン９２の中間に形成された円孔９３と、この円孔９３から第１係合ピン９１までの距離よりも短い距離の位置に形成された長孔９４等により、その基本形状が形成されている。

【００２３】そして、この揺動レバー９０は、図２に示すように、第１羽根体４０及び第２羽根体５０よりも装置の外側（手前側）に配置されて、その第１係合ピン９１が第１羽根体４０の長孔４４に又第２係合ピン９２が第２羽根体５０の長孔５４にそれぞれ遊嵌されており、又、中心に位置する円孔９３にはシャッタ地板１０から突出する支軸１２が嵌挿されており、さらに、長孔９４には後述するロータ６１の腕部６１ｃが遊嵌されている。ここで、支軸１２の中心Ｃ１は、後述するロータ６１の回動中心Ｃ２から所定距離Ｄ１（図３参照）だけ偏倚した位置に配置されている。

【００２４】すなわち、揺動レバー９０は、支軸１２回りに揺動自在となっており、この揺動レバー９０の回動動作に連動して、第１羽根体４０及び第２羽根体５０が往復動するようになっている。例えば、揺動レバー９０が図２中反時計回りに回転するとき、第１羽根体４０及び第２羽根体５０は、お互いに近接する方向（開口部１０ａ，２０ａを閉鎖する方向）に移動し、一方、揺動レバー９０が図２中時計回りに回転するとき、第１羽根体４０及び第２羽根体５０は、お互いに離隔する方向（開口部１０ａ，２０ａを開放する方向）に移動する。

【００２５】上記構成においては、第１羽根体４０の一部である長孔４４に回動自在に連結された第１係合ピン９１が第１連結点に相当し、第２羽根体５０の一部である長孔５４に回動自在に連結された第２係合ピン９２が第２連結点に相当し、これら第１係合ピン９１と第２係合ピン９２との中間でかつ駆動源であるロータ６１の回動中心Ｃ２から偏倚した位置に配置された円孔９３（中心Ｃ１を持つ支軸１２）が揺動支点に相当し、この円孔９３（支軸１２）から第１係合ピン９１又は第２係合ピン９２までの距離よりも短い距離の位置に配置された長孔９４の部分が電磁アクチュエータ６０の駆動力を及ぼす駆動力点に相当する。

【００２６】このように、揺動レバー９０の揺動支点（Ｃ１）は電磁アクチュエータ６０の回動中心Ｃ２から偏倚した位置にあり、かつ、駆動力点（長孔９４）は揺動支点（Ｃ１）から第１連結点（第１係合ピン９１）又は第２連結点（第２係合ピン９２）までの距離よりも短い距離の位置にあるため、揺動レバー９０の回転角度は電磁アクチュエータ６０の回転角度よりも大きくなる。すなわち、電磁アクチュエータ６０の回転角度が増幅されて、揺動レバー９０はより大きな角度範囲を回転することになり、その分だけ、第１羽根体４０及び第２羽根体５０の作動量（移動量）も大きくなる。また、揺動レバー９０は、樹脂材料等により薄板状に成型されて、第１羽根体４０及び第２羽根体５０が配置された羽根室Ｗ内に配置されているため、特別に専用の収容室を設ける必要もなく、簡略な構造にして装置全体の薄型化及び小型化を行なうことができる。

５ｄ等を備えた略Ｕ字形状に形成されている。そして、濃度フィルタ７０は、切り欠き部７５ａの一部の領域を覆うように貼付されている。

【００３６】また、この保持プレート７５は、その長孔７５ｂ，７５ｃにフィルタ地板２０から突出して設けられたガイドピン２１ａ，２１ｂがそれぞれ遊嵌されており、これらガイドピン２１ａ，２１ｂに案内されて図４中の上下方向に往復動自在となっている。尚、図４は、濃度フィルタ７０が下方の移動端に移動して開口部１０ａ，２０ａを開放した状態を示している。

【００３７】これら濃度フィルタ７０及び保持プレート７５が配置されたフィルタ室Ｆの下側領域には、増幅連動手段としての揺動レバー１１０が配置されている。この揺動レバー１１０は、樹脂材料等により長尺な薄板状に成型されており、図４に示すように、その一端部に設けられた係合ピン１１１と、その他端部に形成された長孔１１２と、これら係合ピン１１１及び長孔１１２の中間よりも長孔１１２寄りに形成された円孔１１３等により、その基本形状が形成されている。

【００３８】そして、この揺動レバー１１０は、図４に示すように、保持プレート７５及び濃度フィルタ７０よりも装置の外側（手前側）に配置されて、その係合ピン１１１が保持プレート７５の長孔７５ｄに遊嵌されており、又、その円孔１１３にはフィルタ地板２０から突出する支軸２２が嵌挿されており、さらに、長孔１１２には後述するロータ８１の腕部８１ｃが遊嵌されている。ここで、支軸２２の中心Ｃ３は、後述するロータ８１の回動中心Ｃ４から所定距離Ｄ２（図５参照）だけ偏倚した位置に配置されている。

【００３９】すなわち、揺動レバー１１０は、支軸２２回りに揺動自在となっており、この揺動レバー１１０の回動動作に連動して、保持プレート７５すなわち濃度フィルタ７０が往復動するようになっている。例えば、揺動レバー１１０が図４中反時計回りに回転するとき、濃度フィルタ７０が開口部１０ａ，２０ａを開放する方向に保持プレート７５は移動し、一方、揺動レバー１１０が図４中時計回りに回転するとき、濃度フィルタ７０が開口部１０ａ，２０ａを覆う方向に保持プレート７５は移動する。

【００４０】上記構成においては、濃度フィルタ７０を保持する保持プレート７５の一部である長孔７５ｄに回動自在に連結された係合ピン１１１が連結点に相当し、駆動源であるロータ８１の回動中心Ｃ４から偏倚した位置に配置された円孔１１３（中心Ｃ３を持つ支軸２２）が揺動支点に相当し、この円孔１１３（支軸２２）から係合ピン１１１までの距離よりも短い距離の位置に配置された長孔１１２の部分が電磁アクチュエータ８０の駆動力を及ぼす駆動力点に相当する。

【００４１】このように、揺動レバー１１０の揺動支点（Ｃ３）は電磁アクチュエータ８０の回動中心Ｃ４から偏倚した位置にあり、かつ、駆動力点（長孔１１２）は揺動支点（Ｃ３）から連結点（係合ピン１１１）までの距離よりも短い距離の位置にあるため、揺動レバー１１０の回転角度は電磁アクチュエータ８０の回転角度よりも大きくなる。すなわち、電磁アクチュエータ８０の回転角度が増幅されて、揺動レバー１１０はより大きな角度範囲を回転することになり、その分だけ、保持プレート７５すなわち濃度フィルタ７０の作動量（移動量）も大きくなる。

【００４２】また、揺動レバー１１０は、樹脂材料等により薄板状に成型されて、濃度フィルタ７０及び保持プレート７５が配置されたフィルタ室Ｆ内に配置されているため、特別に専用の収容室を設ける必要もなく、簡略な構造にして装置全体の薄型化及び小型化を行なうことができる。

【００４３】駆動源としての電磁アクチュエータ８０は、図１（ｃ）及び図５に示すように、回動中心Ｃ４回りに所定の角度範囲に亘って回動自在に配置されたロータ８１と、このロータ８１を回動自在に支持する外側支持枠８２及び内側支持枠８３と、通電により電磁力を発生させるための励磁用のコイル８４と、ロータ８１と同心上に配置されて磁路を形成するヨーク８５と、磁束密度の変化を検出するホール素子８６等により構成されている。

【００４４】ロータ８１は、略円柱形状をなしており、図５に示すように、その軸方向両端部に形成された軸部８１ａ，８１ｂが、それぞれ外側支持枠８２の軸受け孔８２ａ及び内側支持枠８３の軸受け孔８３ａに回動自在に嵌合され、その外周の一部から突出して装置の内部に向かう腕部８１ｃの端部が前述揺動レバー１１０の長孔１１２に遊嵌されている。また、このロータ８１は、中心軸（回動中心Ｃ３）を通る平面を境としてＮ極とＳ極とに着磁されている。

【００４５】外側支持枠８２及び内側支持枠８３には、図５に示すように、断面矩形形状の環状溝８２ｂ，８３ｂが形成されており、この環状溝８２ｂ，８３ｂ内においてコイル８４が巻回されている。また、内側支持枠８３は、フィルタ押え板３０に固着された連結板１２０の外側に位置する連結爪１２０ａ及び締結ネジ１３０等を介して、フィルタ押え板３０に固着され、外側支持枠８２は、内側支持枠８３に対して連結爪等により固着されるようになっている。

【００４６】ホール素子８６は、図１（ｃ）及び図５に示すように、外側支持枠８２の外側でかつヨーク８５の内側、すなわち、ロータ８１とヨーク８５との間に配置されており、ロータ８１の回転に伴なって磁束密度が変化（磁場が変化）することにより、異なる電圧値を出力するものである。すなわち、ホール素子８６の出力電圧値とロータ８１の回転角度（回動量）さらには保持プレート７５及び濃度フィルタ７０の作動位置（作動量）と

（ｂ））を覆うように制御される。この濃度フィルタ７０による覆い動作は、光検出センサにより光の強度（光量）をモニターしながら、制御マップ等に基づいて出力される制御信号により常に電磁アクチュエータ８０の駆動量を制御して、覆い量が最適となるように自動的に制御されている。

【００５５】続いて、この動画像を撮影していた図９に示す状態から、静止画像を撮影する場合は、既に最適な絞り口径に調整されているため、撮影者がレリーズ動作を行なうと、撮像素子（ＣＣＤ）に蓄積されていた電荷を一旦放出してリセット（記録された画像を消去）し、露出動作を開始する。ここで、制御部により演算された適正時間（露出時間）が経過すると、制御部から制御信号が出力されて、電磁アクチュエータ８０のコイル８４に逆向きの電流が流され、ロータ８１が反時計回りに迅速に回転して、第１羽根体４０及び第２羽根体５０はそれぞれ近接する方向に移動して、開口部１０ａ，２０ａを閉鎖する。これにより、露出動作が終了し、静止画像が撮影される。

【００５６】次に、デジタルスチルカメラにおいて、静止画像を撮影する場合は、撮影者がレリーズ動作を行なうと、先ず、電磁アクチュエータ６０のコイル６４に対して所定方向にかつ所定量の電流が流されてロータ６１が時計回りに回転する。そして、図６（ａ）に示すように、休止状態において開口部１０ａ，２０ａを閉鎖した位置（閉鎖位置）にある第１羽根体４０及び第２羽根体５０は、図７（ａ）に示すように、開口部１０ａ，２０ａを全開した位置（開放位置）に移動させられる。そして、所定の時間（露出時間）を経過した後、電磁アクチュエータ６０のコイル６４に対して逆向きでかつ所定量の電流が流されて、ロータ６１が反時計回り（逆回り）に回転することにより、図６（ａ）に示すように、第１羽根体４０及び第２羽根体５０は、再び開口部１０ａ，２０ａを閉鎖した位置（閉鎖位置）に移動する。これにより、露出動作が終了して、静止画像が撮影される。

尚、この静止画像の撮影において、光の強度を調整する必要がない場合は、濃度フィルタ７０は、図６（ｂ）及び図７（ｂ）に示すように、開口部１０ａ，２０ａを開放した位置（開放位置）にある。

【００５７】一方、光の強度（光量）が強過ぎる（明る過ぎる）場合は、制御部から制御信号が出力されて、電磁アクチュエータ８０のコイル８４に所定方向でかつ所定量の電流がながされる。そして、ロータ８１が時計回りに回転することにより、濃度フィルタ７０が上方に移動させられて、開口部１０ａ，２０ａを適宜覆い（図１０参照）、最適な状態に制御される。その後、前述と同様に電磁アクチュエータ６０の駆動が制御され、第１羽根体４０及び第２羽根体５０による露光動作が行なわれて、静止画像が撮影される。

【００５８】続いて、動画像を撮影する場合は、撮影者が動画撮影用のボタンを操作すると、先ず、電磁アクチュエータ６０のコイル６４に対して所定方向にかつ所定量の電流が流されてロータ６１が時計回りに回転することにより、図６（ａ）に示すように、休止状態において開口部１０ａ，２０ａを閉鎖した位置（閉鎖位置）にある第１羽根体４０及び第２羽根体５０が、図７（ａ）に示すように、開口部１０ａ，２０ａを全開した位置（開放位置）に移動させられる。

【００５９】そして、光検出センサに検出された光の強度（光量）に関する検出信号と制御マップとに基づいて所定の演算がなされ、光の強度（光量）が強すぎる場合は、開口部１０ａ，２０ａの口径を絞るような制御信号すなわちコイル６４に流す電流量を減じる制御信号が、制御部から電磁アクチュエータ６０に送られて、第１羽根体４０及び第２羽根体５０はお互いに近接する方向に移動し、例えば図８（ａ）に示すように、最適な絞り口径となったところで停止する。さらに、上記絞り動作が行なわれても、最適な光の強度（光量）に調整できない場合は、前述同様に、図９に示すような濃度フィルタ７０による調整が行なわれる。そして、最適な絞り及び光強度（光量）となった時点で、撮像素子（ＣＣＤ）に蓄積された電荷を放出する動作を繰り返すことにより、連続したコマ撮り撮影を行なって、動画像が撮影される。

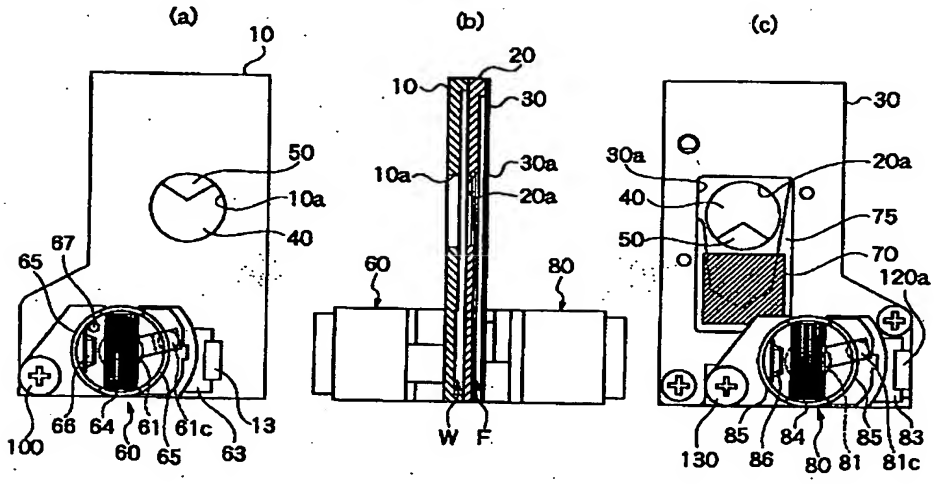
【００６０】以上述べたように、本発明の装置を適用することにより、動画像を主として撮影するデジタルムービカメラにおいても、静止画像を撮影することができ、又、静止画像を主として撮影するデジタルスチルカメラにおいても、動画像を撮影することができる。

【００６１】上記実施形態においては、絞り及びシャッタ機能をなすカメラ用シャッタ装置と、光の強度（光量）を調整するカメラ用濃度フィルタ装置とを兼ね備えた光量可変型カメラ用シャッタ装置について示したが、本発明に係るカメラ用シャッタ装置だけを種々のカメラに適用することができ、又、本発明に係るカメラ用濃度フィルタ装置を他のシャッタ装置と共に種々のカメラに適用することができる。

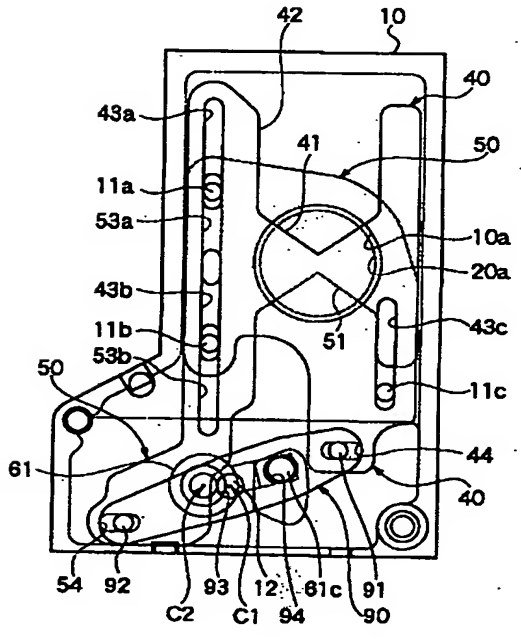
【００６２】また、上記実施形態においては、カメラ用シャッタ装置の増幅連動手段である揺動レバー９０として、第１連結点（第１係合ピン９１）と第２連結点（第２係合ピン９２）とを結ぶ直線上の中間に、揺動支点（支軸１２及び円孔９３）を配置したものを採用したが、この揺動支点は第１連結点と第２連結点とを結ぶ直線から外れた位置に偏倚した構成であってもよく、又、揺動支点と第１連結点とを結ぶ直線上に駆動力点（長孔９４及び腕部６１ｃ）を配置したものを採用したが、この駆動力点は、揺動支点から第１連結点又は第２連結点までの距離よりも短い距離の位置であれば、揺動支点と第１連結点とを結ぶ直線あるいは揺動支点と第２連結点とを結ぶ直線から外れた位置に偏倚した構成であってもよい。

８６　ホール素子
９０　揺動レバー（増幅連動手段）
９１　第１係合ピン（第１連結点）
９２　第２係合ピン（第２連結点）
９３　円孔（揺動支点）
９４　長孔（駆動力点）
１１０　揺動レバー（増幅連動手段）
１１１　係合ピン（連結点）
１１２　長孔（駆動力点）
１１３　円孔（揺動支点）

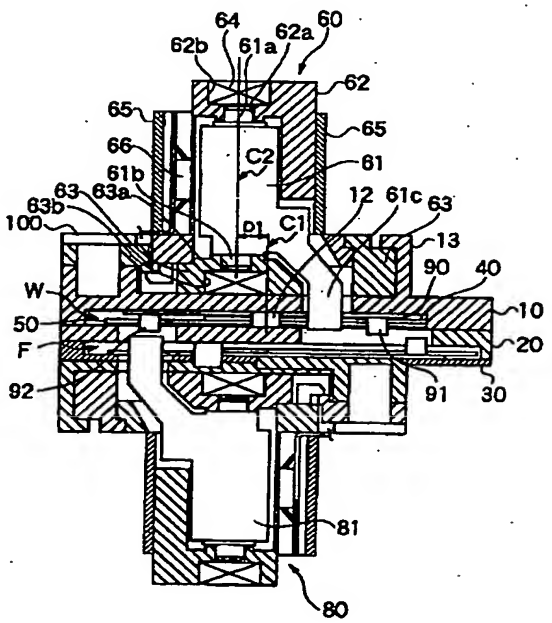
【図１】



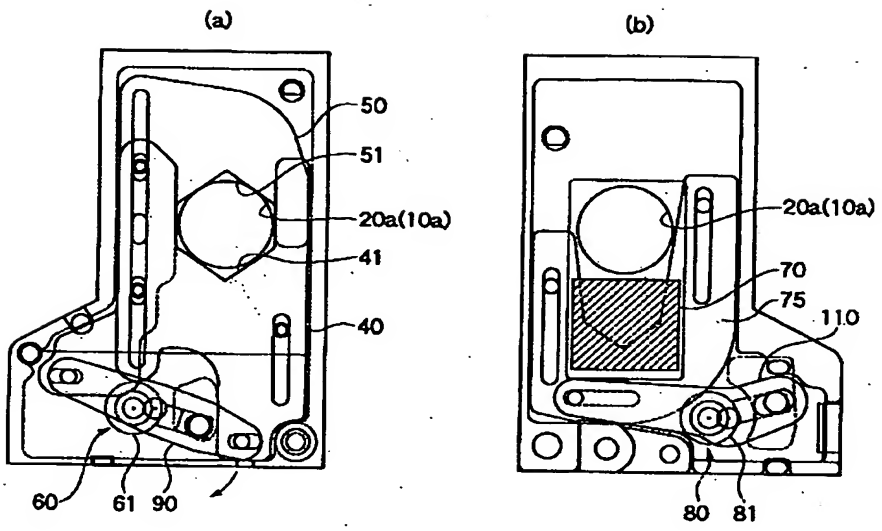
【図２】



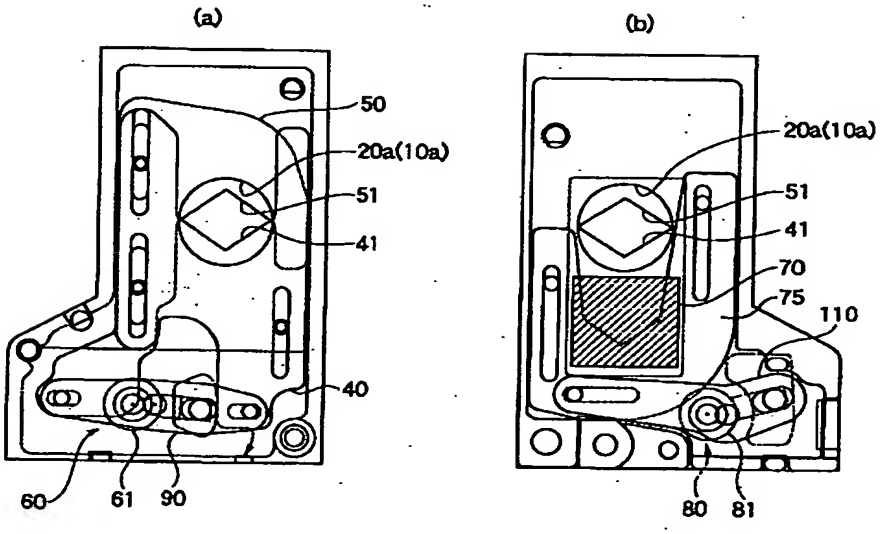
【図３】



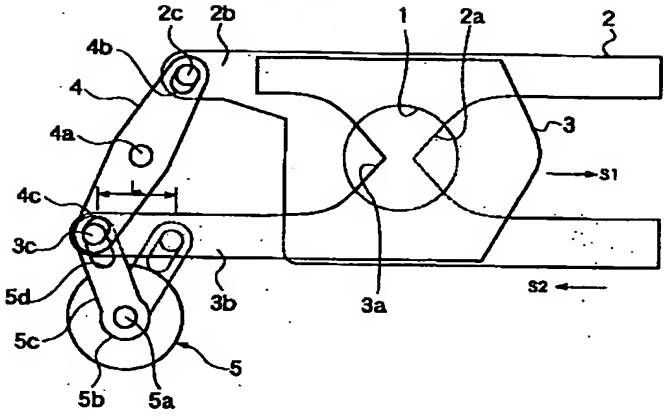
【図７】


(a)
50
51
20a(10a)
41
40
60
61
90
(b)
20a(10a)
70
75
110
80
81

【図８】


(a)
50
20a(10a)
51
41
40
60
61
90
(b)
20a(10a)
51
41
70
75
110
80
81

【図１１】



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